

BIFOCAL: A Next-Generation Electron Instrument for Solar Wind Monitoring and High Phase Space Resolution Measurements

Completed Technology Project (2016 - 2019)



Project Introduction

We propose to develop the electrostatic optics, front-end electronics, and operational algorithms for a next-generation electron instrument capable of providing both routine monitoring and targeted high-resolution measurements from a single compact sensor. The Bifocal instrument will provide full 3-d synoptic "coarse" measurements of the electron distribution, and will also provide targeted "fine" 1.5x1.5 deg. measurements of *any* portion of the distribution, based on either an external trigger or an internal trigger utilizing the coarse measurements. The result of this work will be a TRL-6 instrument that provides high-quality measurements previously requiring two separate sensors, from a single integrated low-resource instrument. This instrument would be ideal for a solar wind monitoring suite, as called out for the high-priority IMAP mission concept, but would also be suitable for a wide variety of high-priority heliophysics investigations.

Anticipated Benefits

Support NASA's strategic objectives to understand the Sun and its interactions with Earth and the solar system, including space weather. This will be achieved by developing/demonstrating instrumentation technology necessary to address the following science goals:

- Explore the physical processes in the space environment from the Sun to the Earth and throughout the solar system;
- Advance our understanding of the connections that link the Sun, the Earth, planetary space environments, and the outer reaches of our solar system;
- Develop the knowledge and capability to detect and predict extreme conditions in space to protect life and society and to safeguard human and robotic explorers beyond Earth.



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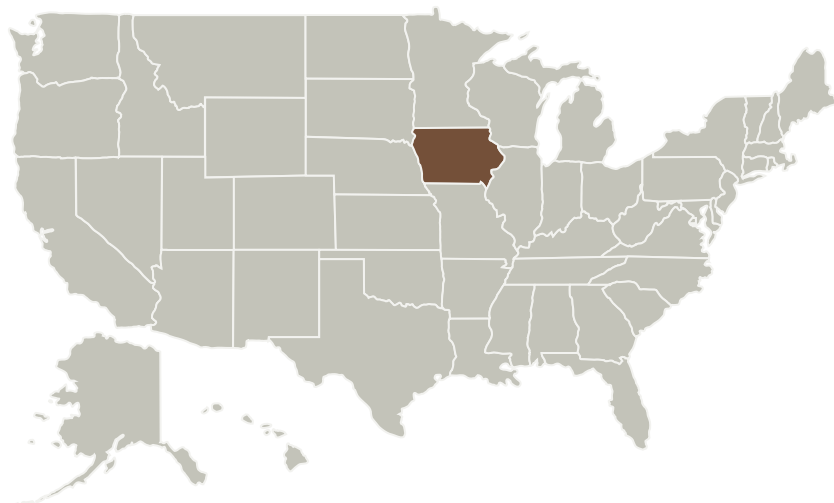
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
University of Iowa	Lead Organization	Academia	Iowa City, Iowa

Primary U.S. Work Locations

Iowa

Organizational Responsibility

Responsible Mission Directorate:

Science Mission Directorate (SMD)

Lead Organization:

University of Iowa

Responsible Program:

Heliophysics Technology and Instrument Development for Science

Project Management

Program Director:

Roshanak Hakimzadeh

Program Manager:

Roshanak Hakimzadeh

Principal Investigator:

Jasper S Halekas

Co-Investigators:

Craig A Kletzing
Scott R Bounds
Lynn Hudachek

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Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **4**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Target Destination

The Sun